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NOTES ON THE LIFE HISTORY OF DATANA ROBUSTA STRECKER.

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On November 13, 1906, I took a large number of larvæ of *Datana robusta* on *Rhus laurina*. They were then nearing the end of the final stage, and in a few days all had pupated. I placed the pupæ in a dry place for the winter, and early in the summer of 1907 sifted them out of the dirt and rubbish and placed them in a cage in a moderately dry cellar. July 13 they began to emerge and on the twenty-seventh I found a pair in copulation; these were isolated and on the twenty-ninth near sundown the female deposited her eggs.

Not being able to spare much time, and being somewhat inexperienced in life-history studies, I sent some of the eggs to Mr. Fordyce Grinnell, Pasadena, Cal., who consented to describe the caterpillars in their different stages, while I was to make notes on their habits, etc.

Mr. Grinnell's larvæ died in the third stage, but I supplied him with material for the fourth and fifth stages; in his descriptions stage three is missing but I have supplied it from my own notes.

I have presented my notes in full, making little attempt at abridgment, trusting that whatever they may lack in value will be made up in added interest.

July 30. About sundown last night I observed the female depositing eggs in a mass on the wood near the bottom of the cage. There are 90 eggs in the mass. The egg is about .8 mm. in diameter, subglobular, pearly white, the surface having the appearance of parchment. A semitransparent spot at the apex is slightly depressed, forming a shallow pit. The base is somewhat flattened.

Note. — Later in the month I took several masses of eggs on the food plant. They were laid indifferently on either side of the leaf but always near the apex. Of six masses counted the number varied from 90 to 180, there being more than 800 in the six masses.

August 2. The two moths in the cage are dead. No change noted in the egg.

August 16. The eggs laid July 29 hatched this morning early. Only two eggs failed to hatch. The little caterpillars are light green, or greenish yellow in color, with large black heads. In leaving the egg they eat out the top, leaving a round hole.

August 17. The young larvæ are eating out the upper epidermis and parenchyma of the leaf through to the lower skin. They are huddled together in a rather compact mass. All are quite lively.

August 18. Very little change since last observation. Head shiny black, body yellow-green, excreta greenish and collected in small masses on the leaves and held together by a fine silky web. The surface of the leaf over which they have fed is covered by a web.

August 19. The little caterpillars have increased to about double the size at hatching. Just back of the head is a transverse black spot or plate from which rises several long white hairs, the whole having the appearance of a collar. At the anal end are two blackish tubercles (probably anal feet) from each of which arises a star of hairs or spines some four or five in number. The whole body is more or less covered with white hairs. The latter half of the body is of a pinkish color.

August 20. Bodies becoming red. Four well-defined yellow lines have appeared on each side of the body, extending from the head to the anal extremity. They are feeding rapidly, generally on the upper side of the leaf, leaving the veins and the lower epidermis intact.

Note. — I have noticed that the young larvæ feeding out of doors always feed on the upper side of the leaf, and have judged that the selection of this particular surface is due to the fact that in this species of *Rhus* the leaves are inclined to fold along the midrib bringing the upper surface of each side together, so that the little caterpillars are afforded a measure of protection.

An interesting habit was noticed to-day for the first time. When slightly disturbed, the larvæ raise the head and strike downward and to one side, bringing the head nearly to the surface of the leaf. This striking is done nervously but in strict time, the whole colony performing together.

August 21. All resting; head and anal extremities raised in characteristic attitude. Yellow lines a little more distinct. Some increase in size noticeable.

August 22. 8 A. M. So far as I can see there is no change since last observation. Perhaps the body is a little larger and the color a trifle deeper. The yellow stripes nearest the dorsal are somewhat blended by the clouding of the interspace.

Note. — I have come to the conclusion that there are no anal feet as in other larvæ that I have observed. The tubercles that were noticed in a former observation are in all probability anal feet that have for some reason degenerated into tubercles, and clothed themselves with hairs or spines either as a matter of protection or for some physiological reason. When excreta are cast they cling to the hairs on these organs and are gradually worked off until free from the body. In the younger stages the excreta are often held together in long bead-like strings.

6 P. M. Still at rest or moving in a sluggish manner. Just back of the head there appears to be a slight constriction. In some specimens there is a small area between the head and the beginning of the body color; this area is transparent or a watery pink. The body is quite thick as compared with the head, which has heretofore been the most prominent part of the caterpillar.

August 23. 7 A. M. One caterpillar has moulted. The head is very light pink and semitransparent. The red of the body is somewhat darker. The stripes are more accentuated, hairs more prominent, white. A collar of longer hairs is seen just back of the head.

3 P. M. Practically all have moulted. The head has turned a shiny jet black. A few are moving about restlessly; none are feeding.

August 24. 8 A. M. The caterpillars have been eating during the night. They are now eating through the whole body of the leaf, feeding along its edge.

7.30 P. M. Clinging in small masses to the leaves and eating ravenously.

August 26. Increased size the only perceptible change. All at rest on the back of the leaf away from the light; this is the only time I observed that they were particularly affected by the light. They ate very heavily during the night.

August 27. 8 A. M. Ate heavily during the night. About half an inch in length. Color becoming darker.

7.30 P. M. All quiet now and evidently preparing to moult.

Note. — When about to moult the skin breaks just back of the head and gradually works backward; I have never been able to detect the slightest motion on the part of the caterpillar during the process of moulting. The head covering separates from the skin and is pushed forward, coming off like a little cap; it often remains on the head until the skin is nearly or quite free from the body. After the moult is completed they rest for some hours before beginning to feed.

August 28. 8 A. M. Nearly all have moulted this morning. The hair is somewhat thicker and longer than at last moult, also the color is somewhat darker and the yellow lines more distinct.

7.30 P. M. Moult complete and the caterpillars eating rapidly. Body color much darker than this morning. Hair so long that the larvæ look almost shaggy.

August 31. The caterpillars have been very active all day and have fed heavily. A considerable increase in size is to be noticed. The color is getting darker.

September 2. Fed heavily last night; no change perceptible.

September 3. 6.30 A. M. The first stage of the third moult has begun. The skin has broken away from the head and the lobes of the new head have begun to push themselves out. The caterpillars are in a compact mass on a stem and are motionless.

7.30 P. M. Moult complete. The caterpillars were bright red when they first emerged but turned brownish black within two hours. The hair is long and quite shaggy.

September 4. Feeding heavily and growing proportionately. Body color quite black, accentuating the yellow of the lines. The hairs are quite white and much more conspicuous than heretofore.

September 7. Caterpillars stopped feeding this morning and are about ready to cast their skins. The skin has broken just back of the head, and the new head appears as a slight swelling between the old skin and the old head covering.

September 9. Caterpillars completed the moult last night and are now of a deep black color, slightly tinged with brownish. Stripes yellow tinged with green. Head black and shiny. Hair white and quite long. They are eating but sparingly.

September 13. Caterpillars the same in appearance as at last observation; not feeding much this morning. During the last few days they have eaten voraciously. They have grown in length and

are now about two inches in length, black in color, stripes less prominent. They have rested but little during this stage, but have rather been constantly on the move. At five this evening they are at rest or wandering aimlessly about the cage. The leaves are eaten in spots only. There is slight enlargement of the body just behind the head much as in the previous stage just before moulting though the skin is not broken.

September 14. At 8.30 this evening the last caterpillar entered the earth to pupate.

RECAPITULATION.

Eggs laid July 29, larvæ emerged August 16, 18 days.
First stage August 16 to August 22, first moult, 6 days.
Second stage August 22 to August 28, second moult, 6 days.
Third stage August 28 to September 2, third moult, 5 days.
Fourth stage September 2 to September 9, fourth moult, 6 days.
Fifth stage September 9 to September 14, fifth moult, 5 days.

Pupa. — The pupa remains in the earth until July or August of the following year.

Datana robusta Strecker.

*Egg.** — Laid in a cluster on the leaves of the food plant. Spherical or subpyriform; white; smooth or very lightly punctured. A slight depression at apex, with a minute black point in the center. The larva eats a circular but very uneven exit from the egg. Hatched August 15, 1907, P. M.

First Stage. — Head black; wide. Body light honey yellow, transparent, the internal organs showing through, a dark subdorsal shade; cervical shield, anal plate, and anal legs, black; thoracic and abdominal legs partly black. Tubercles black, from which arise long black hairs, as well as from the anal feet. The anal feet and posterior part of the body are slightly elevated in repose. They live together in a rather compact colony.

Second Stage. — Changed August 18. Has the characteristic attitude of *Datana* larva with elevated cephalic and anal parts. Head black, shining, punctured. The body is about the same as in the first stage, the hairs shorter; the dark subdorsal band more distinct. Body not so transparent. Tubercles smaller. The subdorsal band is a decided blood red, extending the whole length of the body.

Third Stage. — Length .50 inch; width .05 inch. Head slightly wider than the body, punctate, sparsely covered with short whitish hairs, distinctly bilobed (not deeply) above. Clypeus smooth and shiny.

Cervical shield, suranal plate and anal legs shiny black and clothed with scattered hairs; hairs on the suranal plate and anal legs black.

* These descriptions, except that of stage three, were prepared by Mr. Fordyce Grinnell, Jr.

Dorsal band deep blood red, .02 inch wide. Three subdorsal yellow lines straight, even, extending the whole length of the body. The first and third lines with minute black tubercles in the center of each body segment, some of them twinned, a white hair rises from each tubercle,

Body rather evenly clothed with rusty-white short hairs, thicker along the line of the legs, longer hairs rising from minute black tubercles. Anal extremity from the last pair of abdominal legs constantly erect. Hairs on the anal legs and suranal plate rather stiff and spine-like.

Spiracular line yellow, interrupted at the sutures, wavy in appearance, somewhat broader than the subdorsal lines. Spiracles black.

Abdominal legs (pro-legs) red, with a shiny black plate on the outer side, hairy. Thoracic legs conical, black and shining.

Subventral lines much interrupted at the sutures; ventral line pale but distinct, continuous.

Note. — After receiving the notes on the various stages from Mr. Grinnell, I described the third stage from a lot of larvæ which I had been rearing for specimens. The eggs from which these larvæ came were gathered about the first of October. The larvæ described were in the third day of the stage. During the last three days of the stage the larvæ increased to quite one inch in length but were in all other respects as described above.

Fourth Stage. — Head black, shining, strongly punctured, a little wider than the body, tapering; a few long whitish hairs arise from the head. The body is dark brown or black in color, with three yellow subdorsal bands, running the whole length of the body, wavy in outline, uneven. Body covered with long white hairs, more densely and in tufts from the subventral region. Anal legs conical, black. The cephalic and caudal regions upheld constantly. Exudes a drop of brownish fluid when disturbed.

Fifth Stage. — Head large, black, slightly bilobed, almost as wide as the body, tapering. Prothoracic shield black. Body covered with a fine whitish down or pile, intermixed with a few longer hairs. The stripes are very faint in color, narrow, light yellow, extending the whole length of the body, somewhat interrupted intersegmentally. Body slightly tapering posteriorly.

Pupa. — Body long, thick towards the cephalic part, tapering gradually to the anal extremity. Head slightly projecting, bilobed. Body dark brownish, covered with many rather coarse punctures, a few only confluent. Spiracles large and conspicuous. Wing cases more coarsely punctured.

The early stages of *Datana robusta* (Strecker) much resemble those of *D. perspicua* (Grote and Robinson) as described by Packard in his "Monograph of the Bombycine Moths," 1895. The adults are also very similar.